

# Introduction to Git and GitHub

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Oklahoma Data Science Workshop  
19 September 2025

# Speaker Schedule

**2025 October 17** Nisha Roa on  
causal inference in health  
statistics.

**2025 November 21** Cory Giles on  
graphical neural networks.

**2025 December 12**

**2026 February 20**

**2026 March 27**

**2026 April 20** Jindahl Shah.

**2026 May 15**

# Open topics

- marimo reactive computing
- pluto reactive computing
- Claude Code
- aider
- tmux
- terminal emulators:
  - ★ kitty
  - ★ Ghostty
  - ★ warp
  - ★ Alacritty
  - ★ Wezterm
- Windsurf
- Cursor, helix, zed
- Personal knowledge management:  
supertags, obsidian, org-roam, ekg, logseq
- treesitter and LSPs
- Agentic programming
- Jupyter Lab
- RStudio
- Visual Studio Code
- Software testing
- Reference management
- Prompt engineering
- AI art
- Overleaf
- Regular expressions
- Speech-to-text
- Simulations in data analysis
- Experimental design

# New web address

<https://mediasite.ou.edu/Mediasite/Channel/odsw>

Oklahoma Data Science Workshop

Search...



a platform for scientists at all levels to share how they use computing in their research



Most Recent



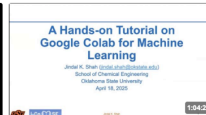
**Generative AI as Muse or Tool in the Research Process**  
31 Views • June 27, 2025

Generative AI is reshaping research—not just by accelerating tasks, but by subtly redefining how we think, write, and validate knowledge. AI now acts as a structural force within scholarly...



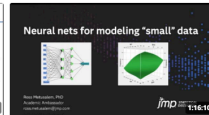
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**A Hands-On Tutorial on Using Google Colab for Machine Learning**  
6 Views • April 18, 2025

Abstract: The tremendous increase in computational power has recently enabled phenomenal growth in the use of machine-learning models over the next decade. Jupyter notebooks offer...



**Neural Nets For Modeling "small" Data**  
11 Views • March 28, 2025

Abstract: In this age of big data, "small" data sets of only tens or hundreds of rows are still quite common. Historically, linear regression has been a primary technique for modeling...

Thank yous to Saturn Padua, Joe Cole, Ralph Craig, and Melissa Nestor

# Objectives:

- Demystify the jargon.
- Explain Git's and GitHub's roles in version control and collaborative coding and writing.
- Demonstrate uses of Git and GitHub in my workflows.
- Prepare past and future speakers to upload slides, notebooks, scripts to DSW GitHub organization and edit the README.md.

# 3.5 hours of hands-on training

<https://libcal.ou.edu/event/14914295>

[The University of Oklahoma Libraries](#) / [LibCal](#) / [Libraries Events](#)



## Software Carpentry: Version Control using Git/GitHub



Version control is a name used for software that can help you record changes you make to the files in a directory on your computer. This workshop will introduce the concepts of version control and introduce the tools Git (software) and GitHub (cloud service). This workshop is for beginners and no previous experience with Git or version control is required.

Benefits of using version control:

- Version control allows us to define formalized ways we can work together and share writing and code. For example, merging together sets of changes from different parties enables the co-creation of documents and software across distributed teams.
- Having a robust and rigorous log of changes to a file, without renaming files (v1, v2, final\_copy)
- Version control allows us to quickly undo a set of changes. This can be useful when new writing or new additions to code introduce problems.
- Version control can help you understand how the code or writing came to be, who wrote or contributed particular parts, and who you might ask to help understand it better.
- While not meant to be a backup solution, using version control systems mean that your code and writing can be stored on multiple other computers.

Registration is required.

October 3, 9 AM to 12:30 PM, LL 123 Classroom, Bizzell Memorial Library  
Dr. Mark Laufersweiler, [laufers@ou.edu](mailto:laufers@ou.edu)

# 20 hours of reading



# Motivation for using version control



You know you're brilliant, but maybe you'd like to understand what you did two weeks from now. - Linus Torvalds



# More reasons for version control

## **Scientists:**

- Collaborate on research projects with others.
- Track changes in data files and code.
- Easily access previous versions of research work.

## **Writers:**

- Keep track of drafts, revisions, and different versions of their work.
- Collaborate more easily with editors or other contributors.

## **Programmers:**

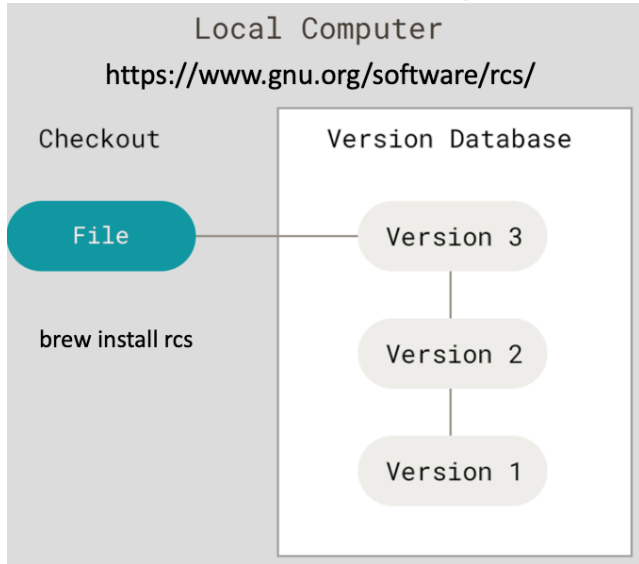
- Collaborate on programming projects with others.
- Manage software development projects.
- Easily roll back changes in case of bugs or issues.

# Make your research FAIR with GitHub

- ✓ Findable
- ✓ Accessible
  - Interoperable
- ✓ Reusable

Wilkinson,M.D., Dumontier,M., Aalbersberg,I.J., Appleton,G., Axton,M., Baak,A., Blomberg,N., Boiten,J.-W., da Silva Santos,L.B., Bourne,P.E., et al. (2016) The FAIR Guiding Principles for scientific data management and stewardship. Scientific data, 3, 1–9.

# Revision Control System (rcs, gnu.org)



# Tracking changes to files in a project

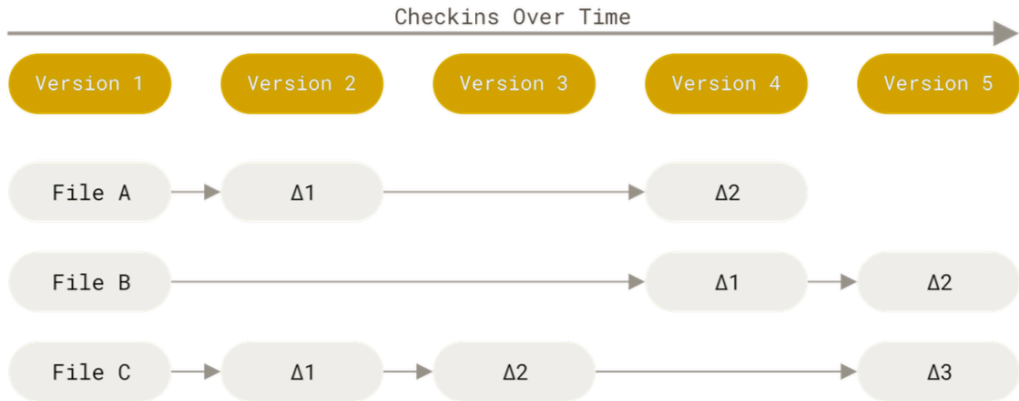


Figure 4. Storing data as changes to a base version of each file

# Tracking snapshots of all files over time

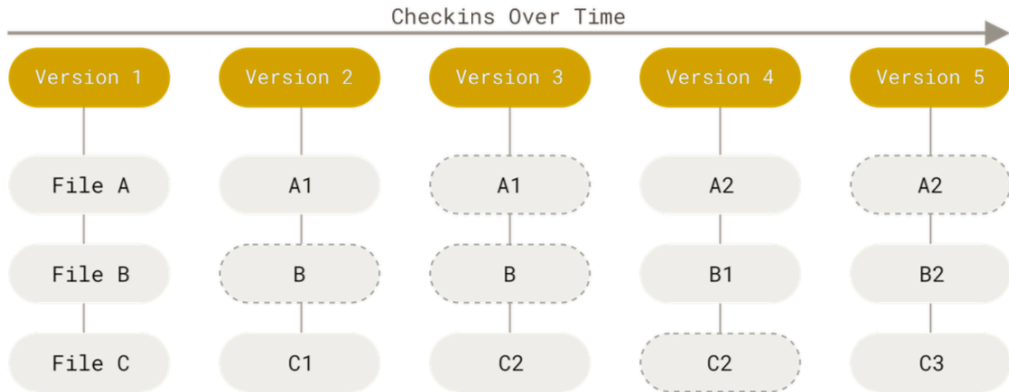


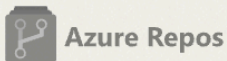
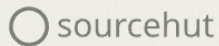
Figure 5. Storing data as snapshots of the project over time

# Version Control Software

- Git (most popular)
- SVN (Apache Subversion)
- Mercurial (hg)
- Perforce
- Bitbucket Pipelines
- TFS (Team Foundation Server)
- CVS (Concurrent Versions System)
- Bazaar
- Darcs

# Web services hosting Git

## Products providing Git hosting



*tangled.sh*



# Repositories added to GitHub last month

Total public repositories: 268,651,144. Source: <https://gitcharts.com>.





# Why Git is so popular?

- **Free and Open Source:** Accessible choice for many individuals and organizations.
- **Distributed Nature:** Each developer has copy of the project for offline work and collaboration.
- **Speed:** Ideal for handling large files and projects.
- **Support for Non-Linear Workflows:** Multiple branches allow n developers to work simultaneously without conflicting changes.
- **Efficient Merge Process:** Git's merge process is efficient and effective.
- **Flexibility:** Provides wide range of tools and options.
- **Easily Integrated:** Packages and plugins integrate git into text editors, IDEs, and computational notebooks.
- **GitHub:** Easy to use web service that is free to academics.
- **Excellent Community Support:** Git has a large and active community.

# A brief history of Git

- 2005** Linux developer Linus Torvalds initially develops Git.
- 2007** The source code is officially released under the MIT license.

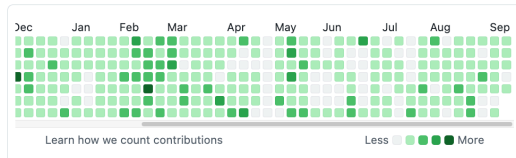
# A brief history of GitHub

- **2008** GitHub founded as a web-based hosting service for Git repositories for open source software.
- **2012** GitHub becomes a popular platform for both open-source and proprietary software development.
- **2015** Microsoft acquires GitHub for \$7.5 billion, one of the largest acquisitions in tech history.
- **2015-Present** GitHub continues to integrate new various tools and services (e.g., CoPilot).

# My use of GitHub

2,570 contributions in the last year

Contribution settings ▾



## Contribution activity

September 2025



Created 82 commits in 16 repositories



[Show more activity](#)

Seeing something unexpected? Take a look at the [GitHub profile guide](#).

2025

2024

2023

2022

2021

2020

2019

2018

2017

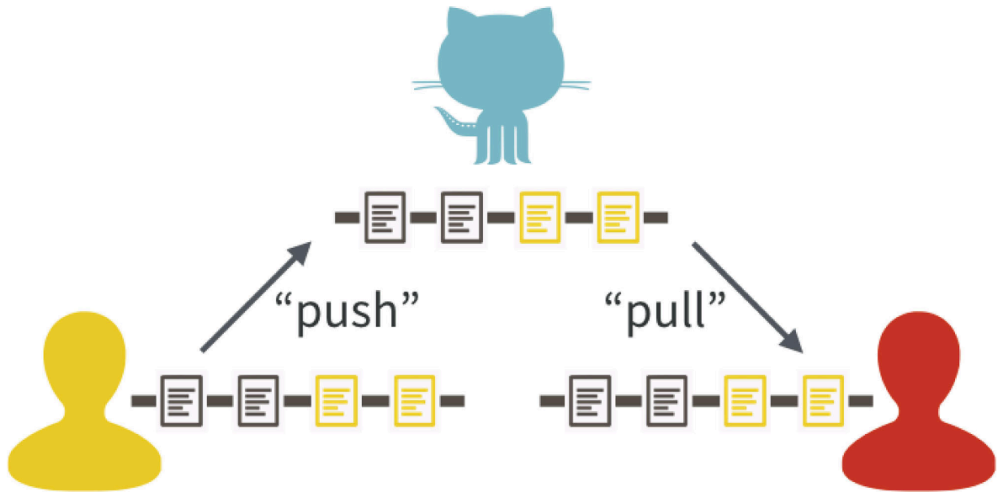
2016

2015

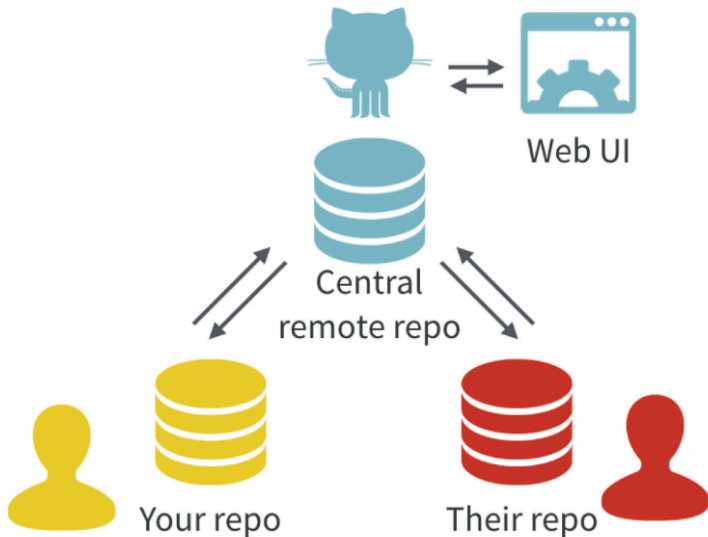
# My uses of Git and GitHub

- Local version control
- Define projects in Emacs with `.git` (`git init`)
- `git clone` external software
- `git clone` writing projects on Overleaf
- Change tracking in collaborative writing on Overleaf
- Create new repositories on GitHub and Codeberg to store code, slideshows, links, writing projects, and databases
- Push changes from local computer to GitHub or Codeberg
- Pull updates to README.md from GitHub or Codeberg
- Branching and merging SciPy papers

# Push and pull to central repo



# Web UI



# Connecting local repo to GitHub

```
echo "# 2094BDA" >> README.md  
git init  
git add README.md  
git commit -m "first commit"  
git branch -M main  
git remote add origin https://github.com/BlaineMooersLab/2094BDA.git  
git push -u origin main
```



# Initial push

```
> git branch -M main
> git remote add origin https://github.com/BlaineMooersLab/3280DSWgithubDSCpilot.git
> git push -u origin main
Enumerating objects: 6, done.
Counting objects: 100% (6/6), done.
Delta compression using up to 16 threads
Compressing objects: 100% (4/4), done.
Writing objects: 100% (6/6), 1.11 KiB | 1.11 MiB/s, done.
Total 6 (delta 0), reused 0 (delta 0), pack-reused 0
To https://github.com/BlaineMooersLab/3280DSWgithubDSCpilot.git
 * [new branch]      main -> main
branch 'main' set up to track 'origin/main'.
```

# Bash function gac ()

```
gac () {  
    echo "Function to git add a file and then commit the changes with a message."  
    echo "Takes the name of a file and the message in a string."  
    echo "Must set up repository in advance of using this function."  
    if [ $# -lt 2 ]  
    then  
        echo "$0: not enough arguments" >&2  
        echo "Usage: gca filename 'message about the commit'"  
        return 2  
    elif [ $# -gt 2 ]  
    then  
        echo "$0: too many arguments" >&2  
        echo "Usage: gct "  
        echo "Note absence of file extension .tex"  
        return 2  
    fi  
    git add "$1"  
    git commit -m "$2" "$1"  
}
```

# Subsequent git push operation

```
> git push
Enumerating objects: 4, done.
Counting objects: 100% (4/4), done.
Delta compression using up to 16 threads
Compressing objects: 100% (3/3), done.
Writing objects: 100% (3/3), 3.29 KiB | 3.29 MiB/s, done.
Total 3 (delta 0), reused 0 (delta 0), pack-reused 0
To https://github.com/BlaineMooersLab/3280DSWgithubDSCpilot.git
  19c8e98..c132ced  main -> main
```

# Push fuction p0126

```
function p0126() {  
  ... cd ~/6114BlaineMooersLabGitHubRepos/0126DirectMethodsLightAtomqRNAs  
  ... cp /Users/blaine/0126DirectMethodsLightAtomqRNAs/main0126.org .  
  ... cp /Users/blaine/0126DirectMethodsLightAtomqRNAs/log0126.org .  
  ... cp -R /Users/blaine/0126DirectMethodsLightAtomqRNAs/figs0126/ ./figs0126/.  
  ... cp -R /Users/blaine/0126DirectMethodsLightAtomqRNAs/abib0126/ ./abib0126/.  
  ... comment="-Updated"  
  ... gac main0126.org "$comment"  
  ... gac log0126.org "$comment"  
  ... gac ./figs0126/ "$comment"  
  ... gac ./abib0126/ "$comment"  
  ... git push  
  ... echo "Pushed the writing project 0126 to GitHub."  
  ... cd /Users/blaine/0126DirectMethodsLightAtomqRNAs  
  ... pwd  
}
```

# Project page on Overleaf

The screenshot shows the Overleaf web interface for a project titled "2200DSW Oklahoma Data Science Workshop". The interface includes a top navigation bar with icons for home, search, and other functions. Below the navigation bar, there is a toolbar with buttons for "Code Editor" (selected), "Visual Editor", "WRITEFULL", and various editing tools. The main content area displays the LaTeX source code for the project, which includes a preamble, a chapter title, and a preface. The code is as follows:

```
1 %!TEX root = ../main.tex
2
3 \chapter{2024 August, Franklin Hays}
4
5
6
7 The next Oklahoma Data Science Workshop is next Friday August 16 at
8 noon via Zoom. This is the Zoom link:
9 https://oklahoma.zoom.us/j/94661289236?
10 pwd=WHdLYkRhMHFFQmlPUHhqQU1uNDRoZz09&from=addon
11
12 Speaker: Dr. Franklin Hays, Department of Nutritional Sciences, OUHS
13
14 Title: Synthesizing Creativity: AI's Revolution in Creative Processes
15
16 Abstract: This lecture ventures into the dynamic interplay between
17 artificial and human creativity. We will discuss cinematic
18 storytelling, computer gaming, popular music, and even classic art vs
19 modern graphic design from the perspective of generative AI's impact.
20 To accomplish this, we will leverage popular culture references (such
21 as Quentin Tarantino's iconic narratives or Depeche Mode's evocative
22 lyrics) to build upon how generative AI is rapidly impacting (or even
23 replacing) human creative processes. This talk touches on underlying
24 questions surrounding AI use to inform, or fully replace, human
25 creativity with associated benefits and limitations.
```

On the left side, there is a file explorer showing the project structure, including folders for "AnnotatedBiblio...", "Content", "Appendices", "codeListings", and "Figures". Below these are several files, with "2024August.tex" highlighted in green. On the right side, there is a preview of the document, showing the title page and the preface. The title page includes the workshop title, the speaker's name, and the date. The preface includes a quote from the speaker and a brief description of the workshop.

# Project page on Overleaf



New project

All projects

Your projects

Shared with you

Archived projects

Trashed projects

ORGANIZE TAGS





















+ New tag

0 ASAP  
submit! (9)

## Your projects

You're using Overleaf Premium

Search in your projects...

<input type="checkbox"/>	Title	Owner	Last modified ↓	Actions
<input type="checkbox"/>	2200DSW Oklahoma Data Science Workshop	You	7 hours ago by You	    
<input type="checkbox"/>	2025words	You	19 hours ago by You	    
<input type="checkbox"/>	8885MS2025-Lecture4	You	23 days ago by You	    
<input type="checkbox"/>	8885MS2025-Lecture5	You	23 days ago by You	    

# Project page on Overleaf

The screenshot displays the Overleaf web editor interface for a project titled "2200DSW Oklahoma Data Science Workshop". The interface is divided into three main sections: a file explorer on the left, a code editor in the center, and a preview window on the right.

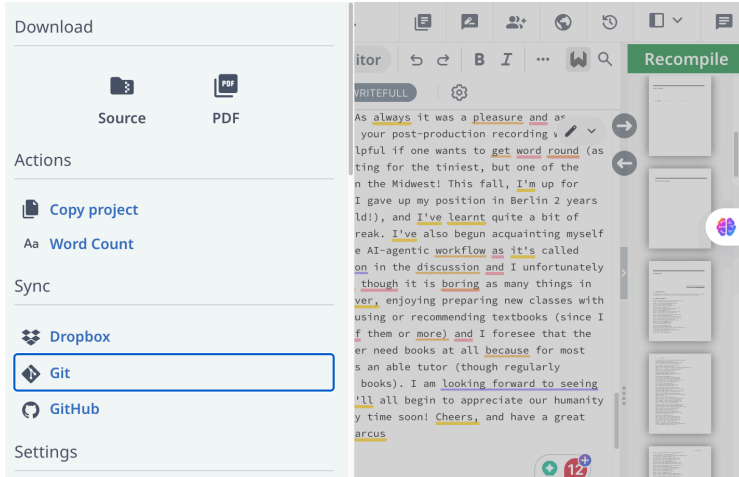
**File Explorer (Left):** Shows a directory structure with folders "AnnotatedBiblio...", "Content", "Appendices", "codeListings", and "Figures". Under "Content", several .tex files are listed, including "2024August.tex" which is currently selected and highlighted in green.

**Code Editor (Center):** Displays the LaTeX source code for the selected file. The code includes a preamble with the TeX root, a chapter title, and a main body with an abstract and a title. The code is as follows:

```
1 %!TEX root = ../main.tex
2
3 \chapter{2024 August, Franklin Hays}
4
5
6
7 The next Oklahoma Data Science Workshop is next Friday August 16 at
8 noon via Zoom. This is the Zoom link:
9 https://oklahoma.zoom.us/j/94661289236?
10 pwd=VHdLYkRhMHFFQnlPUHhqQUludR0oZz89&from=addon
11
12 Speaker: Dr. Franklin Hays, Department of Nutritional Sciences, OUHS
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14 Title: Synthesizing Creativity: AI's Revolution in Creative Processes
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23 replacing) human creative processes. This talk touches on underlying
24 questions surrounding AI use to inform, or fully replace, human
25 creativity with associated benefits and limitations.
```

**Preview Window (Right):** Shows the rendered PDF output of the LaTeX code. The title page displays the workshop name, the speaker's name, and the date. The abstract section is also visible, showing the text rendered from the code.

# GitHub menu





## Clone with Git



Git clone your project by using the link below and a Git authentication token

```
git clone  
https://git@git.overleaf.com/64d242d0b58a6a924c512e8b
```

Copy

If you're prompted for a password, you can use a previously generated Git authentication token. Or you can generate a new one in Account settings. For more support, read our [help page](#).

Close

Go to settings

# Git Authentication token

## Your Git authentication tokens

Your Git authentication tokens should be entered whenever you're prompted for a password.

- You can have up to 10 tokens.
- If you reach the maximum limit, you'll need to delete a token before you can generate a new one.

Token

Created

Last used

Expires

---

*olp\_64eU\*\*\*\*\**

*14th Sep 2024*

# Git Authentication token 2

## Git authentication token



This is your Git authentication token. You should enter this when prompted for a password.

olp\_7ywfp1Stg1YzegGs8BgVfejnPf5YSG109qHz

Copy

You will only see this authentication token once so please copy it and keep it safe. For full instructions on using authentication tokens, visit our [help page](#).

Close

# git clone fail



```
> rm -rf ov
> git clone https://git@git.overleaf.com/64d242d0b58a6a924c512e8b
Cloning into '64d242d0b58a6a924c512e8b'...
remote: Enter your Git authentication token when prompted for a password.
remote:
remote: You can generate and manage your Git authentication tokens in
remote: your Overleaf Account Settings.
fatal: Authentication failed for 'https://git.overleaf.com/64d242d0b58a6a924c512e8b/'
> git clone https://git@git.overleaf.com/64d242d0b58a6a924c512e8b
Cloning into '64d242d0b58a6a924c512e8b'...
Password for 'https://git@git.overleaf.com':
remote: Counting objects: 170, done
remote: Finding sources: 100% (170/170)
remote: Getting sizes: 100% (152/152)
remote: Compressing objects: 100% (256743/256743)
remote: Total 170 (delta 15), reused 139 (delta 14)
Receiving objects: 100% (170/170), 2.93 MiB | 10.21 MiB/s, done.
Resolving deltas: 100% (15/15), done.
```









~/2200DSW ?


# git clone fail 2


```
> rm -rf ov
> git clone https://git@git.overleaf.com/64d242d0b58a6a924c512e8b
Cloning into '64d242d0b58a6a924c512e8b'...
remote: Enter your Git authentication token when prompted for a password.
remote:
remote: You can generate and manage your Git authentication tokens in
remote: your Overleaf Account Settings.
fatal: Authentication failed for 'https://git@git.overleaf.com/64d242d0b58a6a924c512e8b/'
```

# ODSW

  Oklahoma-Data-Science-Workshop

 Overview  Repositories 1  Projects  Packages  Teams  People 1  Insights  Settings

 **Oklahoma Data Science Workshop**

README.md 

## Oklahoma Data Science Workshop (DSW)

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### What is the DSW?

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This is the central site for sharing materials related to presentations made in the Oklahoma Data Science Workshop (DSW) over the past several years. The DSW is a platform for scientists to discuss how they utilize computing in their research. Many of the speakers work in departments where a departmental seminar may not be the most appropriate venue for them to discuss computing and software tools. The DSW provides a venue for scientists to share their knowledge and experiences.

### What is talked about in the workshop?


---

Because the meetings are held in public, the speakers must be aware of the risks associated with discussing unpublished results. Likewise, results involving personal health information have to be de-identified. The same applies to identifying information regarding students who may have participated in a survey. Quite often, the tools and algorithms discussed are at the cutting edge and do not appear in formal coursework for several years, if ever.

# Contribution activity on Codeberg



IssuesPull requestsMilestonesExploreDonate



+

100%



**Blaine Mooers**  
MooersLab

0 followers · 1 following

Oklahoma City, OK, USA

[https://basicsciences.ouhsc.edu/bmb/Faculty/bio\\_details/mooers-blaine-hm-phd](https://basicsciences.ouhsc.edu/bmb/Faculty/bio_details/mooers-blaine-hm-phd)

Academic biomolecular crystallographer who works drug discovery, cancer, and parasitology and who writes in LaTeX, uses Emacs everyday, and codes in Python and Clojure.

Joined on Apr 6, 2023

Repositories11ProjectsPackagesPublic activityStarred repositories6

Your activity is visible to everyone, except for interactions in private spaces. [Configure](#).



385 contributions in the last 12 months

Less More

MooersLab pushed to main at BlaineMooersLab/6003timeTracking 2 minutes ago

daf0846179 Updated mytime.db

MooersLab pushed to main at BlaineMooersLab/6003timeTracking 4 days ago

d46e1db665 Added to wightlifting table.

MooersLab pushed to main at BlaineMooersLab/6003timeTracking 4 days ago

fbe4376e65 Updated mytime.db

MooersLab pushed to main at BlaineMooersLab/6003timeTracking 6 days ago

72177929f7 Updated mytime.db

MooersLab pushed to main at BlaineMooersLab/6003timeTracking last week

a6c09bc7bf Updated mytime.db

MooersLab pushed to main at BlaineMooersLab/6003timeTracking two weeks ago

1d32002639 Updated mytime.db

MooersLab pushed to main at BlaineMooersLab/6003timeTracking two weeks ago

5ec631a767 Updated mytime.db

# Acknowledgements

- Dr. William Beasley

## Funding:

- DISC Summer Pilot Grant
- NIH: R01 CA242845
- NIH: P20 GM103640, P30 CA225520, P30 AG050911-07S1



## Temporary page!

$\text{\LaTeX}$  was unable to guess the total number of pages correctly. As there was some unprocessed data that should have been added to the final page this extra page has been added to receive it.

If you rerun the document (without altering it) this surplus page will go away, because  $\text{\LaTeX}$  now knows how many pages to expect for this document.